Air Force PEO Space Programs

Presented to Defense Contract Management Agency

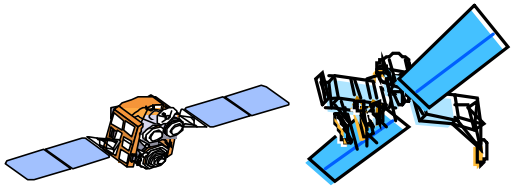
Director's Conference

Mr. Brent Collins

22 Jun 00

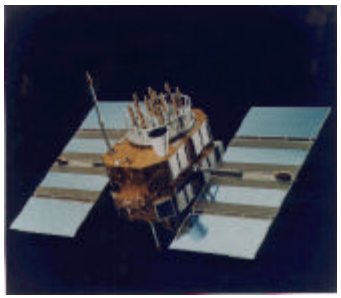
Programs

MILSATCOM



- DSCS
- MILSATCOM
- Advanced EHF
- Wideband Gapfiller

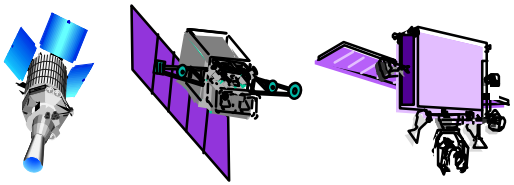
GPS



- IIA
- IIF
- Modernization

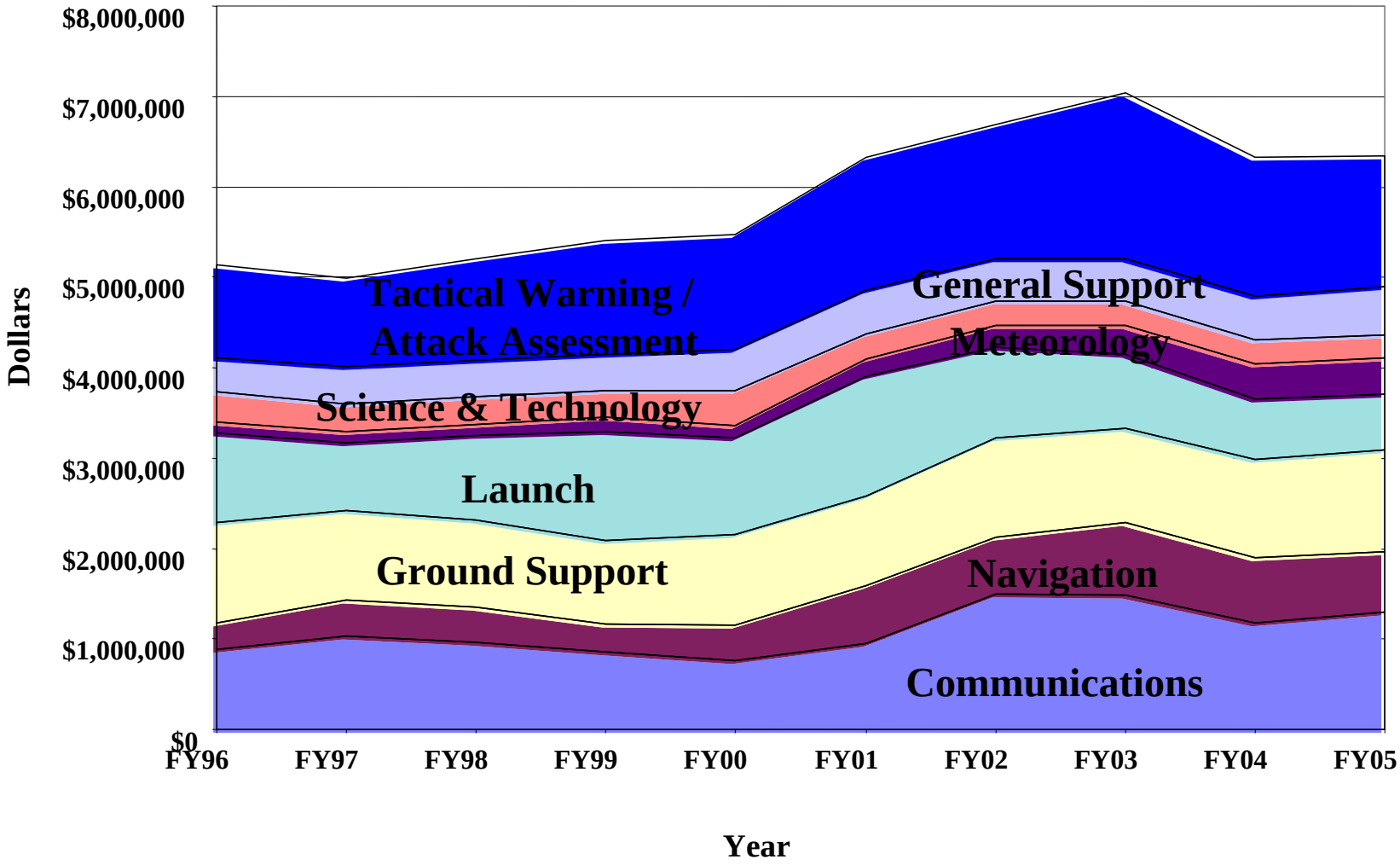
EELV

Missile Warning



- Defense Support Program
- SBIRS High
- SBIRS Low

Air Force Space Programs



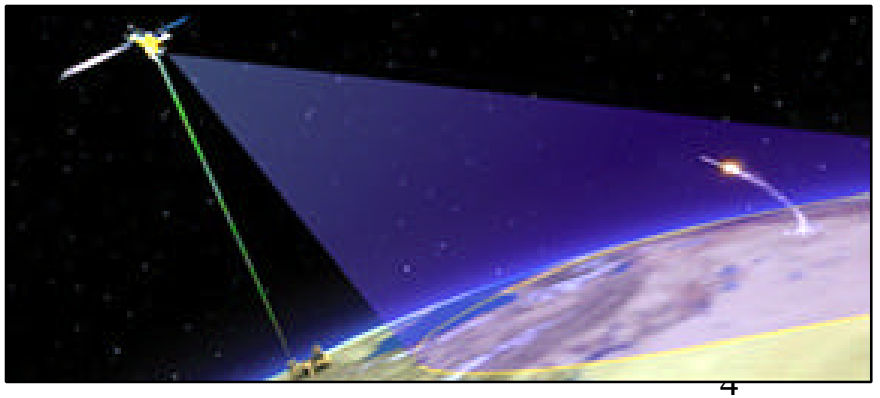
Two Case Studies

Space Launch

- Five Failures
- 3 Titan IV, 2 Delta III in 10 months
- Launch Broad Area Review
- Contractor IRTs
- Transition to EELV
  - 1st Launch 2001 - 2002
  - LCC savings $6.2B

Space Based IR System

- Element of National Missile Defense
- DAES Reporting
- SBIRS High Schedule Breach
  - Caused by Software
  - $80 - $100M Impact



EELV Direction

FY94 Defense Authorizations Act Congressional Tasking

Space Launch Modernization Plan (SLMP) [May 94]; Gen Moorman, Chairman

- **DoD**
- **Intelligence**
- **Civil**
- **Industry**

Nat'l Space Trans Policy (PDD/NSTC-4) [5 Aug 94]

DoD Implementation Plan [25 Oct 94] supported Opt. 2

EELV

ALS

NLS

SPACE-LIFTER

$650M INVESTMENT

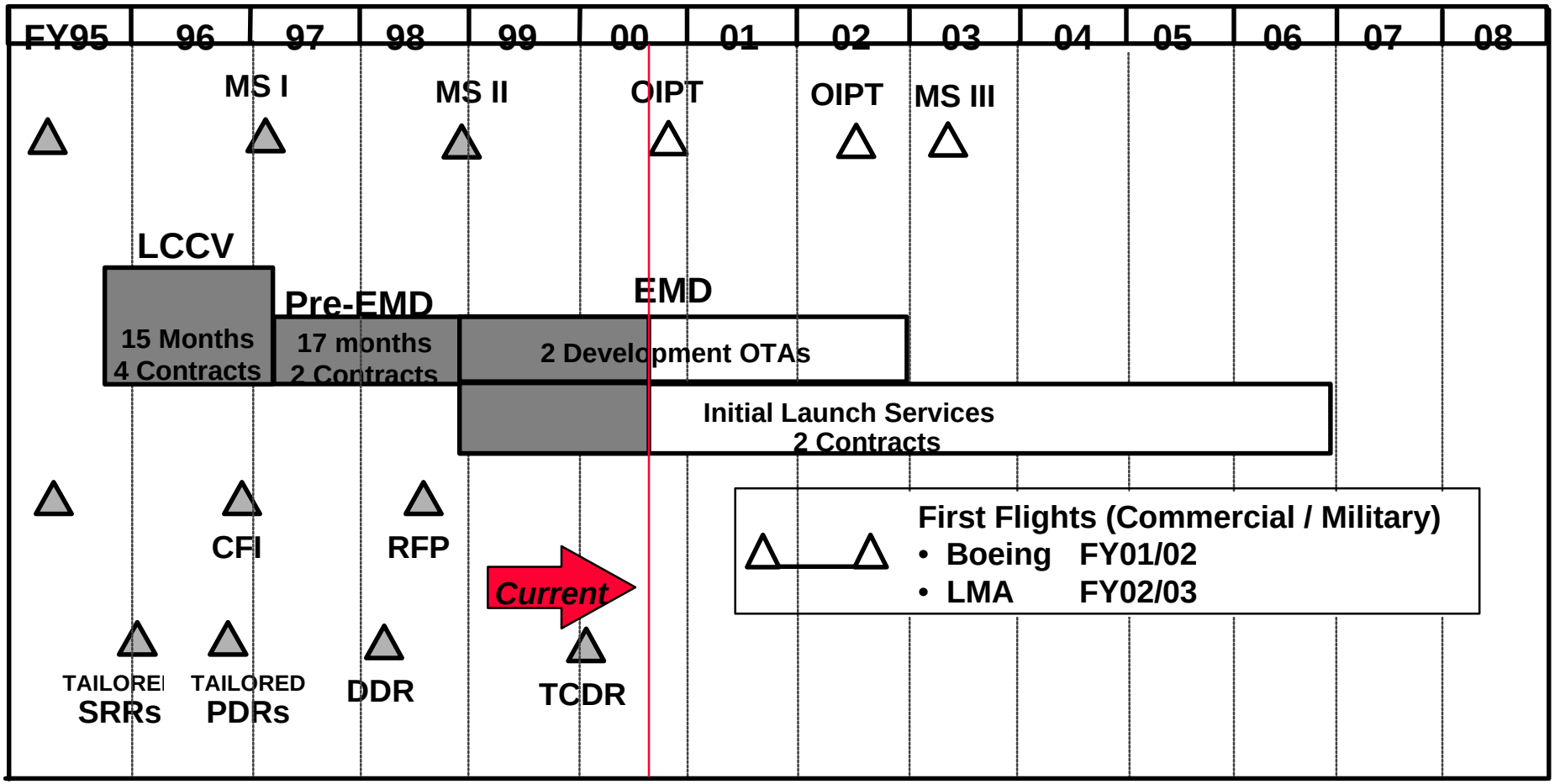
Four Options:

1. **Maintain current fleet**
2. **Evolved expendable systems**
3. **New expendable systems**
4. **Reusable launch systems**

Also recommended:

Investigate use of Russian engines in future ELVs

Program Schedule



MS - Milestone
RFP - Request for Proposal
DDR - Down-select Design Review
LCCV - Low Cost Concept Validation
CFI - Call For Improvements
TCDR - Tailored Critical Design Review
Pre-EMD - Pre-Engineering & Manufacturing Development
SRR - Systems Requirements Review
PDR - Preliminary Design Review

Key Observations -- Fly-out Programs

- Approximately $20B in assets are at risk on Titan, Atlas, and Delta fly-out missions (39 vehicles)--includes critical systems with no spares
- Titan and Inertial Upper Stage (IUS) programs exhibit a premature "going out of business" mindset
- Approach to fly-out systems is influenced by EELV anticipation
- System design and process engineering deficiencies played a prominent role in failures and near misses -- program management
- Clear authority and accountability for delivering DoD spacecraft on orbit is key to increased mission success
- Maintaining engineering and technical support expertise is critical to mission success for these programs
- Given the historical record, satellite constellation planning and budgeting based on 100% launch success (no spares) is unrealistic

BAR Recommendations -- Fly Out Programs

- **Air Force track contractor action to focus program management on disciplined systems engineering and processes**
- **SECAF and CSAF assign clear responsibility, accountability and authority to AFMC for all launch vehicle activities through spacecraft delivery on orbit**
- **Reverse draw-down in engineering support now**
- **Air Force request DCMC increase in-plant technical support**
- **Air Force increase launch base technical manpower commensurate with fly out risk and maintain through transition period of EELV program**

Key Observations -- Transitioning to EELV

- The nation's future access to space depends on successful transition to the EELVs
- In the EELV era, launch will remain the highest-risk aspect of missions in space--most launch systems have experienced startup failures
- The BAR was unable to discover a definition of the planned end state for EELV support of DoD and NRO payload requirements nor a detailed and disseminated plan for transition to EELV
- It has not been defined who will be responsible for delivering a functioning spacecraft on orbit
- The current EELV contracts do not provide mission success incentives

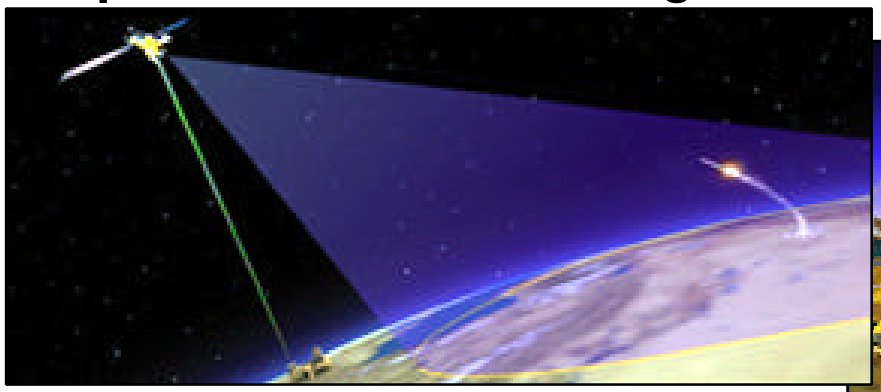
DoD needs to be a continuing smart, more involved customer

BAR Recommendations -- Transition to EELV Families

- SECAF assign clear govt responsibility, accountability, and authority to SMC/CC for delivery of spacecraft on orbit
- Air Force complete and widely disseminate an end state and transition plan that lays out the management approach and the approach to building confidence on the front end of the EELV program
- SAF/AQ and AFMC program resources, including engineering and other support staff to meet needs of transition
- USD (A&T) and SECAF consider investment to accommodate needed reliability confidence-building (both contractors) to provide:
  - Added launch vehicle redundancy and built-in test diagnostics
  - Heavily instrumented verification flights of medium and heavy lift configurations to verify models and simulations
  - Use new micro-technologies to enhance instrumentation
  - Government verification of qualification levels and design analyses at the component level for early launches
  - Additional system level testing to reduce " qualification by similarity" and interaction risks
  - Captive test firing of appropriate EELV configurations

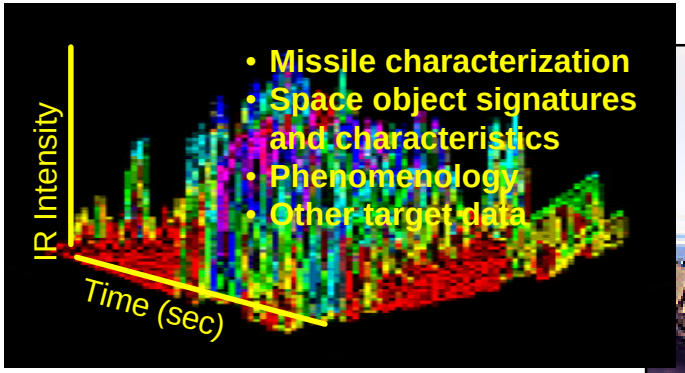
SBIRS Missions

Improved Missile Warning



Battlespace Characterization

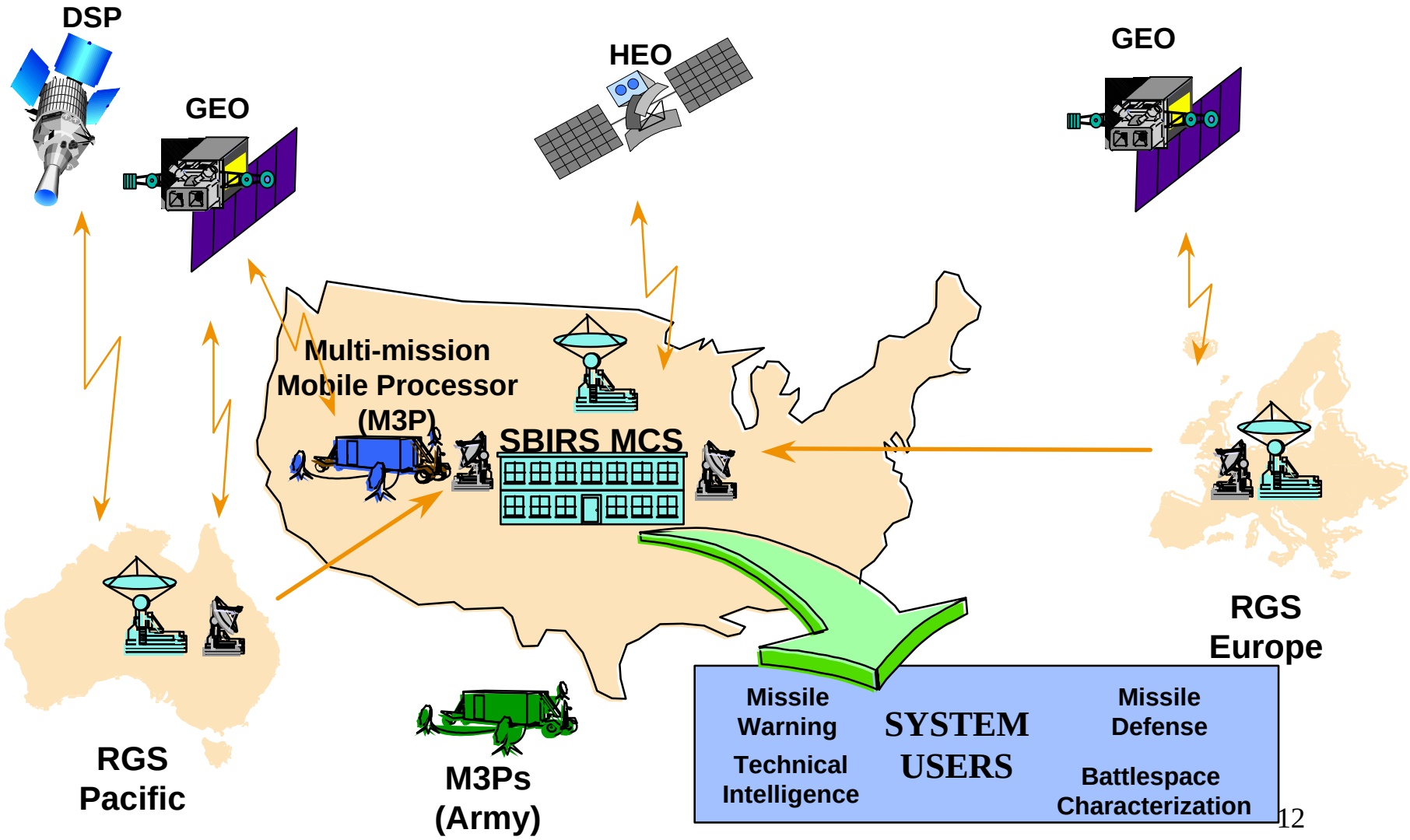
Technical Intelligence



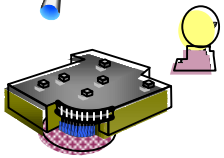
Missile Defense

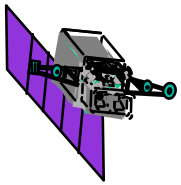
Jointly defined mission capability meets the nation's needs for infrared space surveillance

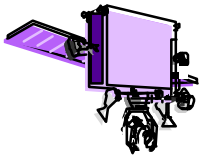
SBIRS - High Component 2004 (Increment 2)



Integrated Program Schedule w/BMD







DSP

SBIRS Ground

SBIRS High (GEO/HEO)

SBIRS Low (LEO) Baseline

Missile Defense Baseline

FY 98 99 00 01 02 03 04 05 06 07 08 09 10

D19 D20 D21 D22 D23

Increment1 (DSP) | Increment1 (+HEO) | Increment2 (GEO) | Increment 3 (LEO)

H1* H2* G1 G2 G3 G4 G5 *Launch as needed

* HEO Sensor delivery for integration

Launches

Full SBIRS High Deployment w/ G4 in FY08

PD ATP JROC Milestone II DAB

JROC

CRG Certification

Test

Full SBIRS Low Deployment in FY10

EMD Source Selection

PDR CDR

SV1-3 SV4-6 9 24

Contract Awards SRR PDR

Launches

Program Definition/Risk Reduction

Engineering Manufacturing Development (EMD)

NMD Deployment Readiness Review

NMD Emergency Deployment

NMD C1 IOC

NMD C2 IOC

THAAD MS II

Navy TW MS II

THAAD/NTW FUE (FY07)

Increment 1 Program Execution (Summary of Assessment Results)

- **Inadequate planning to meet aggressive government schedule**
  - ***No planned architecture definition or requirements decomposition***
  - ***No planned DR resolution or integration and test of modules***
- **Lack of systems engineering and software engineering discipline**
  - ***Good software development plan, but did not comply with processes***
- **Ineffective contractor organizational structure**
  - ***Separate reporting and business structure***
    - **Sunnyvale lacked insight into Boulder's activities**
  - ***SEIT did not ensure ground segment compliance with processes***
  - ***Sunnyvale lacked the software expertise needed to manage Boulder***
- **Government/contractor management issues**
  - ***Right tools, wrong data***
    - **Increment 1 status masked**
  - ***Ambiguous responsibility, authority and accountability***
  - ***Perception of limited government ability to direct contractor***
  - ***Hostile relationship between L-M Boulder and 2SWS caused delays***
- **Development and test facilities inadequate**
- **Warning signs were evident**
  - ***Schedule and cost considered rigid***